



Workshop Report

GLOCHAMORE Global Change in Mountain Regions

3rd Thematic Workshop

Sustainable Land Use and Natural Resource Management in Mountain Regions

Granada and Sierra Nevada, Spain
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edited by

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1. Background

The EU-funded GLOCHAMORE ("Global Change and Mountain Regions") project is predicated on the notion that scientists can contribute to the capacity of mountain communities, managers/coordinators of mountain biosphere reserves (MBRs), and the larger societies that surround them to (i) anticipate the impacts of global environmental change, and (ii) respond in ways that maintain or enhance economic, ecological and social capital (Reasoner et al., 2004). To address global environmental change and its consequences, the GLOCHAMORE project aims at (1) developing an integrative research strategy for detecting signals of global environmental change in mountain environments, (2) defining the impacts of these changes on mountain regions as well as lowland areas dependent on mountain resources, and (3) facilitating the development of sustainable resource management regimes for mountain regions. Following the kick-off meeting of the project (held in Entlebuch, Switzerland, in November 2003), the details of the research strategy are being formulated through a series of product-oriented workshops dedicated to: 1) Long-term Monitoring (Vienna, Austria, May 2004), 2) Projections of Global Change Impacts through Modeling (Aquila, Italy, Dec 2004), 3) Process Studies (Samedan, Switzerland, July 2005), and 4) Sustainable Land Use and Natural Resource Management (the workshop this report addresses). The concepts developed in these Thematic Workshops will be revisited, refined and synthesized during a final Open Science Conference on Global Change in Mountain Regions, to be held in October 2005 in Perth, Scotland, UK.

As a result of global environmental change, the managers of MBRs around the world are increasingly confronted with higher frequencies of extreme events, such as drought, fire, flash floods, glacier lake outbursts, landslides, rockfalls, and avalanches - which all call for adjusted management plans. The alteration of management plans, however, requires a sound scientific knowledge base providing strong arguments to decision-makers and policy people. This fourth workshop on Sustainable Resource Management deals with the interface between scientific knowledge and environmental governance. This is an important topic for study, particularly as exchanges between knowledge and governance are often not transparent or effective.

2. Goals and Objectives

The workshop aimed to investigate the knowledge - governance interface through addressing two main issues:

- how to ensure that scientists and other stakeholders provide policy-relevant information to the managers of mountain systems in general, and the managers/coordinators of MBRs in particular?
- are the mechanisms and institutions of mountain systems, and in particular MBRs, appropriate for governance which can address the challenges of global environmental change?

The analysis of these issues leads to elements for a strategy for applied and participatory research aiming at enhanced communication at the science- governance interface in the context of global environmental change in mountain regions.

In this context, the objectives of the workshop were to:

- 1) review drivers of global environmental change in mountain regions and the resulting pressures on mountain socio-economic systems deriving from these drivers;
- 2) present current theory and data regarding the nature and function of the knowledge-governance interface in mountain regions in both industrialized and developing countries;
- 3) describe the current practices at this interface as experienced by MBR managers/coordinators and other participants;
- 4) identify promising/successful institutional arrangements that enhance communication and collaboration between MBRs and research institutions;
- 5) assess the nature of additional research needed to improve prescriptions for increasing the effectiveness of institutions;
- 6) refine or develop social indicators to monitor progress towards the sustainable use and management of natural resources.

3. Workshop Overview

The workshop built on previous meetings within the GLOCHAMORE project – particularly the Vienna workshop on global environmental and social monitoring and the work of its working group on social monitoring in MBRs (Price, 2004).

All six objectives were addressed and analyzed by researchers and MBR managers in plenary sessions and then consolidated in parallel sessions (except for objective 1; see Annex 1). To achieve applicable and user-oriented results, three working groups were established, each focusing on a specific mountain region:

- the mountains of western Europe;
- the Himalaya and the mountains of Central Asia;
- the mountains of Latin America.

Each working group had the task to:

- refine and develop appropriate criteria and indicators for social monitoring in MBRs;
- identify global change issues (drivers and consequences) to be incorporated in the GLOCHAMORE research strategy.

For each working group, the first working sessions addressed issues related to governance, i.e. how knowledge/science is used in MBRs. The participating MBR managers had received a questionnaire (Annex 3) before the workshop to encourage their consideration of these issues. Specifically, the following questions were to be answered:

- 1) what is the range of structures/institutions (formal and informal) involved in the governance of MBRs?
- 2) what are the perceptions of scientists working in MBRs?

The second working sessions aimed:

- 1) to assess indicators for social monitoring, starting with those developed at the Vienna workshop (Price 2004);
- 2) to evaluate their applicability in the respective regional contexts;
- 3) to refine and further develop these indicators in the light of sustainability in the respective geographical region.

The discussion aimed to clarify, which indicators:

- i. MBR managers/coordinators find useful (to monitor global change and to assess the adaptive capacity of mountain people) and why (relevance, feasibility, etc.)?
- ii. improve our understanding of global change and its impacts?

4. Reports from Working Groups

4.1 Western Europe

4.1.1 Working session on governance, science and knowledge

The designation of a MBR often creates a new territoriality that can trigger conflicts, which depend to some extent on the 'generation' to which a particular MBR belongs (Price, 1996). Four of the MBRs represented in the working group came from the first generation having a conservation/research focus; one from the second generation with a conservation/development focus; and two from the third generation focusing on sustainable development and

local/regional identity. The first-generation MBRs typically have only a core area. In MBRs where the core area, buffer zone and transition zones fall under the jurisdiction of different institutions/authorities, the challenges of governance tend to increase.

Institutional frameworks and stakeholders

The diversity of institutional frameworks and the range of stakeholders varied greatly between the represented MBRs. As MBRs are encouraged to conform to the Seville criteria defined by UNESCO (1995), support for change tends to depend on whether people and institutions see potential benefits deriving from designation as a biosphere reserve, and whether conflicts of interest arise. While MBRs can be seen as opportunities for economic development, the word 'reserve' can create challenges to implementation relating to negative perceptions - on one hand they may be viewed as 'reserves' for 'indigenous' people and, on the other, as the realm of 'conservationists'.

Continued and effective communication between the diverse stakeholders concerned with MBRs, a necessary prerequisite for effective management, can be achieved through various mechanisms, including scientific committees, major interdisciplinary studies, monitoring, and scenario construction for management planning.

Priorities for scientific activities

Most research conducted in MBRs is driven by natural science interests, and individual scientists often work alone. However, there is increasing recognition that natural and social scientists need to work together in multidisciplinary (natural and social science) teams to produce results relevant for MBR management. Instead of passively serving as ideal research sites for scientists, MBRs need to take lead in creating 'learning regions' by combining scientific knowledge, education, and management. Further, MBR managers need to provide a framework for scientists to present their research results to visitors and stakeholders. For this purpose, scientists must be willing to 'translate' their research results into knowledge that can be easily understood by the different stakeholders.

Apart from basic and social science research, a key need – to inform management plans – is for empirical research on which management strategies are effective in achieving conservation success. There is a need for increased effort in training and capacity building, based on solid and site-specific research.

4.1.2 Working session on indicators

The concept of global environmental change encompasses domains such as climate change, globalisation of economies, and globalisation of communication. Indicators measuring the social impact of global environmental change may evaluate 1) the vulnerability of the human system, 2) its adaptive capacity or 3) both.

For MBRs in Western Europe, the indicators proposed by the Vienna workshop were re-grouped into the categories shown in Table 1. While some were omitted because of their limited relevance in the region (e.g., literacy, food security, health), others were added (e.g., policy support, sustainability) or attributed higher priority (e.g. tourism, values and attitudes, ecological/sustainability knowledge). It was proposed that the new categories and many of the new indicators could also be appropriate for other regions of the world. More detail for each indicator is available in the proceedings of the workshop to be published by UNESCO.

Table 1: Indicators for social monitoring for Western European MBRs.

Category	Minimum set	Medium set	Maximum set
Land	Land cover Land ownership/tenure	Land use change Hazards	Productivity

Water	Water quantity	Water quality	
Population	Census (number, gender) Permanent residents Migration	Numbers of medical centres & doctors	Mortality, diseases
Livelihoods	Sectoral employment	Farming (including livestock numbers)	
Economic dimensions	Income (total tax income)	Compensation for restrictions Value of property	
Tourism	Tourist beds Visitors to BR facilities	Number of tourists at specific locations	Frequencies, seasonality, types of tourists
Policy support	Amount/source of public funds		Infrastructure
Problem-solving	Functioning BR-society mechanisms		Chronology of interactions
Adaptive management		Hazard management	Incorporation of new knowledge in BR management
BR human resources	Number of staff Training		Visions, goals
Sustainability	Environmental actions (BR+public)		Values, attitudes Public knowledge

4.2. Asia

4.2.1 Working session on the institutional involvement in MBRs or protected area management

To improve the management of MBRs, a thorough understanding of the institutional actors involved in decision-making and implementation processes is fundamental. Since the political, administrative, legal, and societal settings differ between countries, the working group assessed the major institutional actors in the represented MBRs (Table 2).

Table 2: Institutions involved in decision-making and implementation in a sample of Asian MBRs as identified by workshop participants. To indicate the degree of influence or importance, three categories have been distinguished: high (bold), medium (normal), and low (italic).

	China	India	Mongolia	Nepal	Russia
Inter-Governmental Organisations	UNESCO: MAB	World Heritage Site / UNESCO	UNDP, GEF	World Heritage Site / UNESCO	<i>UNESCO: MAB, WHS</i>
International	UNESCO: MAB		GTZ, Dutch Gov.,	ICIMOD, UNDP, The	<i>WWF, UNDP</i>

Organisations	Committee		<i>Canada Fund, UNESCO Mongolia</i>	Mountain Institute	
State Institutions					
Federal / National Government	State Ministry for Forest; State Ministry for Environment ; Ministry for Science: Chinese Academy of Sciences, other scientific institutions	Union Ministry of Environment and Forests; <i>Research Institutions</i>	Ministry of Nature and Environment: MAB Mongolia, International Conventions, <i>Universities</i>	Ministry of Forest and Soil Conservation: Dept. of National Parks and Wildlife: (Core Area; also Buffer Zone) Department of Forest: (Transition Area) <i>Ministry of Education: Universities Research Institutions</i>	MAB Committee Ministry of Nature Resources - Agency of Control in Ecology and Use of Nature Resources (Core Area) <i>Universities</i>
State / Province / Oblast	Forestry Department, <i>Environmental Department</i>	<i>Provincial-State Govt:</i> Biosphere Reserve Directorate: Forest Dept / Agriculture Dept / Rural Development Dept (Core Area; also Buffer Zone)	Provincial government: Research Institutions		Republic Government (Buffer Zone and Transition Area)
Local / District / Rayon / Sub-Province	<i>Local Government</i>		<i>Sub-Provincial 'soum' Government</i>	Inter-District / District: Forest Dept(s): Park Management (Core Area; also Buffer Zone)	Rayon Administration (Buffer Zone, Transition Area)
Village		Village Development Council, Forest Development Council (Van	<i>Village / Community</i>	Village Development Committees (Buffer Zone) Community	Community (Transition Zone; <i>also Buffer Zone</i>)

		Panchayat) <i>, Women Dev. Council, Youth Dev. Council</i>		Forest User Groups (Transition Area)	
Population					
Community/ groups	<i>Travel agencies</i>	(see self help groups above)	<i>Citizen's Representati ves 'hural'</i>	represente d by Village Developme nt Committees (see above)	Scientific Advisory Board of BR (Core Area and Transition Zone; also Buffer Zone)
Individuals		<i>Individuals</i>	<i>Individuals</i>		<i>Individuals</i>
Non- Governmen tal Organisatio ns	<i>Non- Government al Organisation s</i>				
External		these have no relevance in Indian situation – specifically in the Nanda Devi Reserve	WWF, <i>Australian Aid</i>		
Internal		<i>several local NGOs</i>	<i>Buffer Zone Council, CBOs, Private Sector, Other NGOs</i>	WWF-Nepal, IUCN-Nepal, King Mahendra Trust for Nature Conservation , Tourism Agencies	Joint Stock Company (Transition Area) Travel Agencies (Buffer Zone and Transition Area; <i>also Core Area</i>)

Institutional arrangements

In the core area of MBRs in Kyrgyzstan, India, Russia, Nepal, and China, the approved management plan guides the MBR Director in achieving conservation goals, specifically those set for the core area. In Mongolia, the Protected Areas Management Department also intervenes in daily management matters.

In the buffer zone, the MBR Director generally has a strong say, but is required to respect the customary rights of the local inhabitants and appropriately involve them in designing and executing the management tasks in the approved plan.

A transition area can have private, community, and/or government land; the proportions vary greatly. Landowners generally decide what they want to do on privately owned land. As the MBR Director has no legal authority within the transition area, he has to engage in informal discussions and consultations with landowners to address management issues.

In this context, a range of potential sources of conflict was identified. The most frequent problems relate to conflicting interests between the needs or requirements of the BR managers responsible for conservation and those of the local inhabitants. The following recommendations result:

- 1) Decision-making mechanisms, obstacles and opportunities to improve the environmental condition of the buffer and the transition zone should be studied, taking into consideration the specificities of each MBR;
- 2) Research should be participatory and trans-disciplinary to lead to more effective management decisions. Specifically, such research should help (i) to better understand and incorporate traditional knowledge systems, (ii) to consider community participation in decision-making, and (iii) to give marginalized groups a voice.
- 3) Prior to any research programme, a neutral party should conduct a social impact assessment.
- 4) Monitoring and evaluation of the state of MBRs should be conducted by neutral/independent entities.
- 5) Both research in, and the management of, MBRs should give greater attention to the signals and impacts of global environmental change.
- 6) Meaningful management plans should consider comprehensive development strategies taking into account both the interest of nature conservation and the livelihood needs of the local people.
- 7) There is a clear need to design and develop new institutional arrangements or forms of social organisation to respond to local needs and to adapt accordingly. This should be done in a participatory way.

Management of MBRs or protected areas

There are many obstacles to overcome while managing such protected areas:

- lack of, or inadequate institutional arrangements in decision making; legislative gap: while Nature Reserves, National Parks, Nature Parks etc. have their legislation at federal and regional level, BRs lack such legislation;
- low priority of nature conservation given by Government;
- inadequate or lack of coordination between different stakeholder groups;
- missing or limited capacities in conflict resolution skills suitable to address tensions and conflicts related to BR management;
- lack of qualified staff or sufficient human resources for management in general, or of funds for MBR management;
- high fluctuation of personnel;
- inequitable distribution of benefits stemming from the buffer zones and transition areas;
- complicated bureaucracy; a whole cascade of different jurisdictional institutions starting from the State government downwards complicates decision-making and implementation.

4.2.2 Working Session on indicators

Monitoring over an extended period allows the detection of processes and trends. The active participation of local communities in BR-related research and management activities is essential, and should address:

- 1) natural resources or environment, including assessment of indicators related to biomass, biodiversity, soil fertility, agricultural productivity including forest productivity, or water. Appropriate attention has to be paid to traditional knowledge and the monitoring of the adaptive changes of local populations over time and space.
- 2) the socio-cultural and economic systems on which the next section focuses. The group strongly proposed working with a 'Livelihood-centred approach', beginning with an assessment of the current livelihood conditions (DFID, 1999) and strategies to provide a clear reference base for future changes. Key elements such as the role of livestock and its linkages with the other elements of the productive system will thus become more evident. The definition of such key elements is crucial to eventually anticipate possible reactions or actions by local actors relevant for BR management.

The following key elements for a socio-economic, cultural and political assessment were considered relevant for MBRs:

- food security: This is an issue in many BRs where rural food production does not cover subsistence needs;
- land use and land cover changes: This is a critical indicator, since it reveals rapid adaptations of livelihood strategies and is likely to have immediate and direct impacts on MBR management. Particular attention has eventually to be paid to upland-lowland interactions;
- land tenure: Land ownership is a very sensitive indicator for rapid changes or adaptations from a livelihood strategy perspective;
- dependence on local resources: Monitoring of the type and degree of dependence on local resources can help to assess changes and eventually anticipate possible negative or positive impacts.

MBR managers appear to be increasingly concerned with unforeseen stresses happening over shorter time frames for which communities are not able to make the needed adaptations in time, and so their traditional knowledge might therefore lose its value. Forced changes to adapt livelihood strategies are likely as a result of either stresses and pressures or new opportunities. Consequently, tensions and/or conflicts due to conflicting interests can appear or intensify. Likely changes and possible indicators for local conditions in the various MBRs include:

- Land use changes:
 - shift from rain-fed to irrigated land or to cultivation of non-timber forest products on community or private land; possible reduction of pressure on pasture land;
 - decrease of water availability / quality or increase of water use leading to increased water stress;
 - introduction or expansion of tourist activities;
 - changes in land tenure.
- Insufficient or decreasing economic income:
 - migration of populations to and/or out of the region / role of remittances: type; contribution to livelihood, utilisation of remittances, gender aspects, use of the remittances;
 - changes in gender and age pyramid / composition.
- Changes in services:
 - availability and/or kind of health services;
 - availability of education services.

In a next step, the expected impacts from these anticipated or potential changes should be described or assessed in order to develop mitigation strategies or measures where necessary. This should also include the assessment of the values of ecosystem goods and services to have a reference base.

4.3. Latin America

4.3.1 Working sessions on institutions and stakeholders

Public sector actors involved in MBR management include those at national, provincial and district levels, and also indigenous authorities. Private sector actors include landowners, NGOs, peasant communities, and the productive sector. The functions of these actors are basically restricted to their institutional or community objectives. Cooperation and coordination towards a common long-term goal are often weak.

BRs have public recognition but there is no legislation for them, although they are directly related to national park authorities. There is therefore a legal weakness for BR management. However, MBR core areas are public lands with legal directives, usually managed by national park managers. Actions in the buffer zone are prioritized in the action plan (management

plan) but, since the administrators have no legal competence in the buffer zones and transition areas, responsibility is shared with too many stakeholders and becomes more difficult.

There is very little information and also little awareness among both MBR managers and local populations of the impacts of global change on ecosystems. If the participation of local stakeholders in management increases, the capacity to take ecosystem adaptive measures is strengthened.

In the represented Latin American countries (Chile, Colombia, Peru), environmental issues are not taken much into account. Political power is very permissive and the major impacts are produced by the productive sector and indirectly by the public sector. Due to high levels of poverty, these countries are dependent on the private sector for investments and jobs, so the economic condition of the different regions determines the level and nature of impacts from productive activities. Thus, the poorer the region, the more permissive the stakeholders will be with respect to environmental impacts.

The incorporation of new information to enhance the capacity of different actors, structures, and institutions should not be a problem, but to change attitudes in peasant communities or the public sector takes time. The generation of adaptive strategies could easily create new opportunities for people living in MBRs. These strategies have to be preceded by strong education and training campaigns at all levels.

Perceptions of scientists working in MBRs

In all MBRs in Latin America, work is done by scientists from a great variety of disciplines, sometimes also considering traditional knowledge systems. Most scientists work independently. All investigators must have official permission from the park or BR manager to conduct research in the core area. They have the freedom to investigate what they want; however, research aimed at better management is encouraged but has only begun recently. In the other zones, there is often no regulation from the MBR management, but scientists have to have permission from the local people.

4.3.2 Working session on indicators

Starting from the indicators identified at the Vienna workshop, the working group identified three sets of indicators – high, medium, and low priority – as shown in Table 3. Comments on these indicators with regard to their relevance and measurement, and in relation to previously proposed indicators are included in the proceedings of the workshop to be published by UNESCO. The working group members stated that the remaining indicators suggested in Vienna (tensions and conflicts, values and attitudes, trust in the BR/institutions, visions and goals, external influence of the BR manager/coordinator) would provide very important information, but are not easily measurable. The working group members suggested that there should be a minimum set of indicators for global and regional comparison; and that a multi-scale approach within and between BRs is necessary to deal with scale differences and to avoid overgeneralization (particularly of indicators).

Table 3: Indicators for social monitoring for Latin American MBRs.

High priority (minimum set)	Medium priority (medium set)	Low priority (maximum set)
Vegetation cover	Sources of livelihood	Reasons for migration
Land use	Level of poverty	Dependence on local resources
Quantity of water	Investments in the BR	Value of ecosystem goods and services
Quality of water	Vulnerability	Ecological sustainability knowledge

Population		Number of community-based organizations (CBOs)
Health		
Employment		
Literacy		
Food security (or malnutrition)		
Agricultural productivity		
Forest productivity		
Livestock		
Tourism		
Participation of different actors in BR management		
Human pressures and possible impacts		

4.3.3. Recommendations

The working group made a number of recommendations. They noted that economic/poverty drivers and land use change are particularly relevant for MBRs in Latin America. At the local level, high priority should be given to local stakeholder involvement, particularly in buffer zones and transition areas. Scientists should work through local 'instances' for permission, involvement and socialization of all research activities. Equally, local channels of communication for the dissemination of planning, implementation and results need to be identified and used. There is also a need for capacity building through the training and involvement of local researchers. A distinction should be made between indigenous and non-indigenous priorities, strategies and potential solutions; aspects of cooperation/complementarity and possible conflicts between stakeholders to develop integrated solutions need to be investigated. Community-based research on global issues needs to be encouraged, which may require specific incentives.

While the 'distinctness' of individual MBRs needs to be maintained – which implies there are no single solutions - regional/global networks or sub-networks are needed for scientific and management cooperation. Aspects of cooperation include (1) the development of MBR planning and management tools to assist individual countries in regional or local planning (for countries with no legal status for BRs); and (2) the documentation of successful experiences (methods, approaches, activities, participation, etc.) and facilitation of diffusion/exchanges with the participation of major stakeholders. Finally, BRs should be incorporated in national, regional or local legal frameworks and planning processes.

5. Outcomes

As the workshop progressed, the great diversity of situations both within and between the three regions addressed by the working groups became apparent. Nevertheless, common themes appeared during both sets of working sessions, and provide important bases for a strategy for applied and participatory research in MBRs and other mountain regions.

A key conclusion not only for this workshop, but for the GLOCHAMORE research strategy in general, is the importance of ensuring that scientists from a wide range of natural and social science disciplines work together in interdisciplinary teams. In fact, such research should go beyond being interdisciplinary: it should be transdisciplinary, i.e. including other stakeholders such as MBR managers and their equivalents and, critically, also members of local communities. For scientists, this requires a commitment (1) to encourage local people's participation, thus enabling them to bring in their concerns and priorities, and (2) to present scientific research ideas and results in ways that can be easily understood by the various

stakeholders – including language that is comprehensible to non-scientists. Scientists should also be willing to listen to local stakeholders and to incorporate their ideas and perspectives into research and monitoring. Thus, research and monitoring should be based on not only ‘western’ science, but also traditional knowledge. The GLOCHAMORE research strategy should include an element of reflexivity to evaluate the success or effectiveness of such transdisciplinary activities.

One particular area on which interdisciplinary research (and monitoring) is needed concerns the most effective participatory decision-making mechanisms and/or management structures for achieving the goals of MBRs, so that these can be implemented – an existing need which is made more urgent by global environmental change (GEC). In general, neither the signals nor the (actual and potential) impacts of GEC are well recognised by either MBR managers or local populations. This implies a significant need for appropriate communication regarding these signals and impacts by those in the scientific community who are aware of them. This links further to needs for training and capacity building. In regions where data and information are sufficient, scenario construction may be one element of these processes. Again, the relevance of this conclusion goes well beyond the themes addressed in this workshop.

With regard to the specific objectives of the present workshop, significant refinements were made to the indicators developed in the Vienna workshop, and it was recognised that very few are probably applicable at the global level; the regional – and even local – context must always be taken into account if indicators are to be meaningful for informing the development and implementation of both management actions and policy. In particular, even though the western European working group suggested that the indicators they proposed would be appropriate in other regions, this may not necessarily be true, depending on both different economic/social/political/environmental contexts and the existing and likely availability of relevant data and information. One important point to be made is that, in western Europe, agriculture and/or forestry are no longer the primary sources of livelihoods, and populations are rarely growing significantly; the converse is generally true in MBRs in developing countries. However, certain themes do appear to be of general relevance as presented below. The first two sets of indicators are contextual and largely natural science-based, and link to other parts of the developing GLOCHAMORE research strategy:

- water quality and quantity;
- land cover and land use change;
- land tenure/ownership;
- population and age structure, and migration (and reasons for this);
- tourism facilities and numbers of tourists;
- livelihoods and income – though what should be monitored depends on the region; tourism is increasingly important; remittances are important in MBRs in many developing countries;
- food security in MBRs in developing countries; however, knowledge of livestock numbers appears to be of general relevance for both livelihood and conservation reasons.

These themes (though not all the detailed indicators proposed within them) echo the first six categories proposed by the western European working group; most of the other issues identified for possible high-priority indicators by this group were not identified as such in the other two working groups.

In summary, considerable work yet needs to be done to identify and then implement effective indicators for social monitoring in MBRs and other mountain regions. In contrast to many of the indicators proposed in previous GLOCHAMORE workshops, there may be a greater need to distinguish between the situations and needs in different parts of the world. Participatory action research, management, and monitoring in specific mountain areas are likely to underline such differences. At the same time, there is a need to develop protocols for social monitoring that enable MBR managers and scientists to generate comparable data sets. Such sets of data of reliable origin are required, in particular, for modeling purposes. In this context, attention should also be given to existing structures and themes for monitoring, both within individual countries and internationally (e.g., BRIM and GTOS).

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Appendix I: Workshop Agenda

Sunday, March 13

Arrival of participants (for MRI Board Members: MRI Scientific Advisory Board Meeting)

Monday, March 14

9.00	Workshop Opening Welcome <i>Javier Sánchez Gutierrez (Sierra Nevada Biosphere Reserve)</i> <i>General Advisor (Junta de Andalucía Environmental Council)</i>
9.45	Session 1 <i>Chair: PS Ramakrishnan (Jawaharlal Nehru University, India)</i> Introductory and keynote presentations on objectives 1 & 2: <ul style="list-style-type: none">• Global environmental change in mountain regions as a challenge to management• Social theory and constructs from economics, political theory, cultural anthropology, complex systems studies• Knowledge systems Global Change impacts as perceived by MBR managers <i>Greg Greenwood (MRI, Switzerland)</i> Objectives and outcomes of the workshop <i>Martin Price (UHI Millennium Institute, Scotland)</i> The Institutional and Political Context of Biosphere Reserve Management <i>Mark Nechodom (US Forest Service, USA)</i>
10.45	Discussion
11.00	<i>Coffee Break</i>
11.30	Keynote presentations on objectives 1 & 2 (cont'd) Allocating mountain water: uncertainty and impacts <i>Sandra Brown (Univ. of British Columbia, Canada)</i> The science world and the biosphere reserve managers and decision makers. The case of the BR of Minorca (Spain) <i>Juan Rita Larrucea (University of the Balearic Islands, Spain)</i> Sustainable development and global change in the mountains of Southwestern Europe (Andalucía) <i>Rosario Pintos Martín (Director Natural Protected Areas Net In Andalucía)</i>
13.30	<i>Lunch (Botánico Café)</i>
15.00	Session 2 <i>Martin Price (UHI Millennium Institute, Scotland)</i> Introduction to Working Groups (see below)
15.15	Regional working sessions under objectives 2 & 3: <ul style="list-style-type: none">• Western Europe (Chair: Thomas Hofer)• Himalayas and Central Asia (Chair: Daniel Maselli)• Latin America (Chair: Christoph Stadel) The sessions will be structured in a common way to facilitate comparison across regions and with the theory presented in theme 2. Coffee break individual

18.30	<i>Adjourn</i>
20.00	<i>Dinner</i>

Tuesday, March 15

9.00	Working Group chairs of Session 2 report to plenary Discussion and synthesis
10.30	<i>Coffee break</i>
11.00	<p>Session 3 <i>Martin Price (UHI Millennium Institute, Scotland)</i></p> <p>Introduction and keynote presentations on objectives 4 & 5: New approaches</p> <ul style="list-style-type: none"> • Networks for research for sustainable development in mountain areas • Participatory research and monitoring <p>The Mountain Partnership – New opportunities for networking on mountain research <i>Thomas Hofer (UN Food and Agriculture Organization)</i></p> <p>Innovative approaches for generating knowledge to support sustainable mountain development – Example of a Strategy for the High Pamirs in Tajikistan <i>Daniel Maselli (University of Bern, Switzerland)</i></p> <p>Session 4 <i>Martin Price (UHI Millennium Institute, Scotland)</i></p> <p>Introduction and Keynote presentation on objective 6:</p> <ul style="list-style-type: none"> • Indicators and evaluation of sustainability <p>Indicators and evaluation of Sustainable Natural Resource Management and Governance <i>Susanne Stoll-Kleemann (Humboldt University of Berlin)</i></p>
	Discussion
13.00	Field trip to the Sierra Nevada BR (including lunch)
18.00	<p>Session 4 (cont'd)</p> <p>Regional working sessions under objective 6:</p> <ul style="list-style-type: none"> • Western Europe (Chair: Thomas Hofer) • Himalayas and Central Asia (Chair: Daniel Maselli) • Latin America (Chair: Christoph Stadel) <p>The principal aim of the discussions is to consider the draft list of indicators developed during the first GLOCHAMORE workshop and evaluate their applicability in the respective regional contexts. If time allows, consideration will also be given to Objective 4 & 5.</p>
20.00	<i>Adjourn</i>
21.00	<i>Dinner (individual)</i>

Wednesday, March 16

9.00	Session 4 (cont'd)
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	Working Groups as on previous evening
<i>11.00</i>	<i>Coffee break</i>
11.30	Group chairs of Session 4 report to plenary Discussion and synthesis
12.00	Session 5 <i>Chair: Thomas Schaaf (UNESCO MAB, Paris)</i> Discussion on Next Steps: <ul style="list-style-type: none"> • Workshop synthesis and how to get there • Workshop products and how to get there: <ul style="list-style-type: none"> • Workshop Proceedings • Workshop Report • Peer-reviewed synthesis article • Research/implementation strategy pre-proposals as input for the Open Science Conference in fall 2005
<i>14.00</i>	<i>Lunch (Botánico Café)</i>
15.45	<i>Excursion to La Alhambra</i>
<i>20.00</i>	<i>Dinner</i>

Thursday, March 17

8.30	Session 6 <i>Chair: Greg Greenwood (MRI, Switzerland)</i> Working Groups work on workshop products
10.00	Working Group chairs of Session 6 report status to plenary Next steps, deadlines and responsibilities
11.30	<i>End of Workshop</i>

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Appendix III: Questionnaire

Decision-making in Mountain Biosphere Reserves

Some initial questions for MBR managers

for the GLOCHAMORE workshop on

"Sustainable Land Use and Natural Resource Management in Mountain Regions"

Sierra Nevada, Spain, 14-17 March 2005

1. Who makes or influences decisions about the daily management of the reserve?

Mountain biosphere reserves (MBRs) have formal management structures (director, line officers, staff to advise the director, etc.). Sometimes the formal structure is ineffective. If funding isn't available, for instance, not all positions are filled. Then informal arrangements, e.g. with other institutions, may be able to fill the gaps that insufficient funding left. If the formal structure does not match the local culture, the management may not even be able to operate. Informal arrangements are not necessarily failures. In contrary, if MBR managers create alternative management structures that work on the ground, such informal arrangements can lead to success.

⇐ Please describe the **structure of the relationships** between your MBR personnel and other personnel or important authorities (locally or nationally) that contribute to the management of the MBR.

As an alternative, you might also draw a diagram using big circles for influential authorities/institutions/persons, and small circles for less important ones. The distance between the circles reflects the degree of collaboration, cooperation or understanding (e.g., circles close together = good collaboration, circles wider apart = loose contacts).

2. What are the desired changes and who wants them?

Not everyone is satisfied with the present management of any MBR. Some may want more access to resources that are important to them for livelihood, income, recreational, religious, or other reasons. Others may want to reduce uses that damage valuable resources. Others may want to bring in new management procedures (e.g., fees, planning, limits on harvests or access).

⇐ Please describe the **different groups and the desired changes** in management they want.

Group	Desired Change in Management

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3. Who makes policy for the long-term management of the reserve?

All MBR managers respond to someone, such as the Regional Director, the Minister, the Legislature, or the Board. These policy makers generally provide policy guidance for the use and management of the MBR. Periodically, they check back with managers and stakeholder groups to see how well the MBR is meeting the diverse needs. However, often the formal structure does not accurately describe how policy is really made. For example, a particular legislator may strongly influence the Board, without even having a seat there. That legislator may in fact be responding to a local authority figure who would otherwise have no formal relationship with the MBR.

- ⇐ Please describe **who makes the policy** that guides the management of your MBR.
- ⇐ **How is that policy created** (e.g. through plans, through regulations, through directives, through laws)?

4. Women in decision-making positions

Women are often excluded from the decision-making positions in which policy and implementation are determined. The active involvement of women and the integration of their agendas can have important impacts on the management policies for the MBR, and how these policies are implemented.

- ⇐ Please describe any **mechanisms and structures** in the management of the MBR which encourage or hamper women's participation in decision-making process.
- ⇐ In which **hierarchical levels** of the MBR management women are represented?

5. What mechanisms allow input from stakeholders or scientists in the daily management or the policy governing the reserve?

Various informal mechanisms can allow local and non-local stakeholders to express their interest in the MBR and therefore influence decision or policy-making. Many governments have recognized that more open and transparent processes for considering or incorporating the ideas of stakeholders can lead to more rapid progress.

- ⇐ **Do such mechanisms to include stakeholders' views exist in your MBR** (e.g. a management committee including local people, formal consultation processes for specific issues or management decisions, participatory rural appraisals, participatory action research)?
- ⇐ **How well they have worked?**
- ⇐ **Have any other ones been proposed; and if so, by whom?**
